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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C.

In the Matter of	)	
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Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems	)	ET Docket 98-153
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REPLY COMMENTS OF SIRIUS SATELLITE RADIO, INC.

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Sirius Satellite Radio Inc. ("*Sirius*") hereby replies to the comments submitted in response to the Commission's March 26, 2001 Public Notice[1] that requested comment on the test data submitted by Qualcomm Incorporated, the University of Texas and Johns Hopkins University, the National Telecommunications and Information Administration, and the Department of Transportation in the above-captioned docket.

I. The Most Recent Reports And Comments Indicate That Ultra-Wideband ("UWB") Devices: (A) Cause Harmful Interference Into Tested Receivers; And (B) Should Not Be Allowed To Operate Below 3.1 GHz

A. Nearly all the comments emphasize that UWB devices cause widespread interference into a variety of receivers, and that the limited, across-the-board modifications to Part 15 proposed by the Commission will be inadequate to protect licensed systems.[2]

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1 *Comments Requested on Reports Addressing Potential Interference from Ultra-Wideband Transmission Systems*, DA 01-753 (rel. March 26, 2001)

2 Time Domain Corporation has alleged that the interference shown in the most recent reports does not constitute "harmful interference." *See generally* Comments of Time

As several commenters point out, the recent tests found interference into Global Positioning System ("GPS") receivers in 88% of tested cases.[3] In the case of aviation GPS receivers, interference was found in 93% of the cases.[4] Furthermore, of most relevance to Sirius, we continue to be particularly disturbed by the effects of UWB interference into PCS handsets, which share certain relevant operating characteristics with Digital Audio Radio Service ("DARS") receivers.[5] As the Qualcomm report shows and the comments of Sprint Corporation emphasize, UWB interference into PCS handsets causes dropped calls and requires an enormous increase in base station infrastructure to maintain acceptable system performance.[6] Apart from the fact that licensed users, who have already paid billions of dollars for the right to use spectrum, should not be forced to bear such costs, remedial measures of this type would be simply impossible for DARS providers[7], and inevitable and unacceptable service degradation for DARS users would result.

Domain Corporation, ET Docket 98-153 (Filed April 25, 2001, as amended April 26, 2001). Sirius believes that this point is best addressed in depth by the parties who actually conducted the most recent tests. However, Sirius notes that in the case of sensitive receivers like DARS that operate near the noise floor, even a small increase in interference (i.e. a 1 dB increase in DARS noise floor) can have a disruptive and significant negative impact on service and, therefore, would be considered harmful interference.

3 *See, e.g.*, Comments of Aeronautical Radio, Inc. and The Air Transport Association Of America, Inc. ET Docket 98-153 (filed April 25, 2001), at 9; Comments of the U.S. GPS Industry Council, ET Docket 98-153 (filed April 25, 2001), at 5.

4 Comments of ARINC & ATA, at 9.

5 Like PCS handsets, DARS receivers are omnidirectional and operate with low link margins. *See* Comments of Sirius Satellite Radio, ET Docket 98-153 (filed April 25, 2001), at 2-3. DARS receivers are, in fact, more susceptible to UWB interference, since DARS receivers operate at lower link margins than do PCS handsets.

6 *See* Comments of Sprint Corporation, ET Docket 98-153 (filed April 25, 2001) ("*Sprint Comments*") at 2-4

7 *See* Comments of Sirius Satellite Radio, at 3-4.

UWB proponents continue to ignore the fact that it is their burden to show that UWB devices *do not cause interference* to licensed systems. Even from the most generous perspective, the record is clear that this burden has not been met with respect to those systems tested to date. Despite UWB proponents' claims that the interference characteristics of UWB devices can be mitigated, there simply is no evidence in the record that the technical parameters of the Commission's proposal to permit deployment of UWB devices will be sufficient to prevent harmful interference to primary, licensed systems.

In the face of an ever-increasing body of evidence to the contrary, many UWB proponents simply persist in claiming that UWB devices do not cause interference and may be permitted on an unlicensed basis and without band restrictions.[8] These comments rely on questionable challenges to the procedures and conclusions of filed reports[9] or anecdotal evidence,[10] and are insufficient to meet the UWB proponents' burden of showing non-interference.

The comments of Time Domain Corporation and XtremeSpectrum essentially claim that all of the studies besides the Time Domain-funded UT-Johns Hopkins study used assumptions designed to find interference too easily. Ultimately, the Commission must decide whether NTIA, DOT, and Qualcomm's assumptions were "unrealistic."[11] However, given that UWB devices would become ubiquitous if allowed on an unlicensed basis, and thus would cause

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8 *See, e.g.,* Comments of Time Domain Corporation, at i; Comments of David L. Wright, at 10; Reply Comments of Geophysical Survey Systems, Inc., ET Docket 98-153 (Filed April 18, 2001), at 1-2.

9 *See* Comments of Time Domain Corporation at i-ii; Comments of XtremeSpectrum, ET Docket 98-153 (Filed April 25, 2001)at 2.

10 *See* Comments of The Ground Penetrating Radar Circle of Finland, ET Docket 98-153 (Filed April 20, 2001)at 2; Comments of Dr. David L. Wright, at 2; Reply Comments of Geophysical Survey Systems, Inc., at 2-3.

interference to licensed services in many different operating scenarios, Sirius is confident the Commission will consider that NTIA, DOT, and Qualcomm's interference scenarios were appropriate and quite realistic. Further, Sirius believes that because the parties constructing the tests, especially NTIA and DOT, were aware that UWB signals may interfere with critical safety-of-life systems such as E-911 and avionics sensors, those parties took special care in developing appropriate interference scenarios to cover all potential impacts of UWB devices.[12]

B. The test results clearly show, and a significant number of comments emphasize, that UWB devices should not be permitted to operate below 3.1 GHz.[13] The most recent reports and comments amply indicate that acceptable UWB operation in this part of the spectrum is not merely "challenging;"[14] it is simply not feasible if licensed services are to be adequately protected. Further testing and analysis may indicate other bands in which UWB deployment should also be limited.[15] However, given the effects of UWB signals on systems such as DARS, PCS and GPS that are located below 3.1 GHz, the wide variation of UWB devices' signal characteristics, and the extensive use of this part of the spectrum by sensitive licensed systems,

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11 Comments of XtremeSpectrum, at 2.

12 Especially considering the safety of life systems at risk, the testers may not have erred enough on the side of caution in selecting interference assumptions. In addition, the test scenarios may have been too generous to UWB devices, since, for example, a true co-location scenario, as in the case of UWB and GPS (or DARS) receivers located in the same automobile, was not tested. *See* Comments of U.S. GPS Council, at 4.

13 *See* Comments of U.S. GPS Council, at 7; Comments of Sprint Corporation, at 4-5; Comments of ARINC & ATA, at ii.

14 NTIA, *Special Publication 01-45, Assessment of Compatibility Between Ultrawideband Devices and Selected Federal Systems*, Lawrence K. Brunson *et. al.* (February 2001), at x

15 *See* Comments of ARINC & ATA, at ii (stating that UWB devices should not be allowed below 5.5 GHz), *and* Air Transport Association of America *et al., ex parte* letter, ET Docket 98-153 (filed March 27, 2001) (letter signed by 26 parties stating that virtually every radio service operating below 6 GHz, and many above 6 GHz, could be affected by rules ultimately adopted)

this band restriction is necessary, no matter what regulatory scheme is adopted by the Commission.

II. The Commission Should Propose A Regulatory Scheme Which Classifies UWB Devices And Sets Operating Limits To Prevent Harmful Interference

If UWB devices are permitted to operate above 3.1 GHz, a new regulatory scheme is needed to permit those operations above 3.1 GHz. Whether it takes the form of a major revision of Part 15 or some form of licensing,[16] the first step of the new regulatory scheme must be to define each specific class of UWB device and then identify the critical parameters of each class. This will enable the Commission to determine and apply operating requirements class-by-class, ensuring effective protection of licensed systems. Commenters have proposed a variety of operating limits and technical specifications that may help various classes of UWB devices to operate without causing interference, including power levels and PRF modulations,[17] specific band restrictions,[18] signal masking,[19] and the possibility of reducing spectral lines and making UWB signals more "white-noise like."[20] Clearly the Commission should carefully consider each of these proposed parameters as it crafts a regulatory regime for UWB devices. However, given

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16 *See* Comments of The Boeing Company, at 11.

17 *See, e.g.* Reply Comments of ANRO Engineering, ET Docket 98-153 (Filed April 20, 2001), at 2

18 *See, e.g.,* Comments of U.S. GPS Council, at 2 (GPS bands); Comments of Nokia, Inc., ET Docket 98-153 (Filed April 25, 2001), at 2 (cellular and 3G systems bands).

19 *See* Comments of XtremeSpectrum, Technical Statement on Reports Addressing Potential GPS Interference From UWB Transmitters, ET Docket 98-153 (Filed April 25, 2001), at 3-4.

20 *See* Comments of Prof. Don Sinnott, ET Docket 98-153 (Filed April 24, 2001) at 1.

the current minimal state of understanding of UWB signals and their effect on various types of receivers, it is not yet possible to determine which, if any, of the proposed operating limits will prove effective, or if any one of them will be effective for all types of UWB devices or for all types of victim receivers.[21]

As evident from all of the comments, significant issues remain in dispute concerning methodology and results of several of the recent tests. Even more important, additional testing and analysis remain to be done, particularly on the impact of UWB emissions on PCS devices and on DARS. As noted in its comment, Motorola will submit test results shortly concerning interference into its devices. Qualcomm's report stated that it is in the process of analyzing the aggregate effect of UWB devices on PCS handsets. Finally, Sirius has proposed its own test program to analyze the effects of UWB signals on DARS receivers.[22]

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21 For example, XtremeSpectrum proposes to limit UWB communications to indoor environments. This proposal is hardly consistent with other UWB proponents' descriptions of the numerous potential uses of UWB technology. The proposal will of course not help remedy interference from non-"communications" UWB devices such as automobile proximity sensors. Finally, it may not even work for communications devices. *See* Comments of Dr. Robert J. Fontana, ET Docket 98-153 (Filed April 17, 2001), (stating that "[a] UWB wireless LAN in the home or apartment next door can create havoc" with a radio receiver.) As with any of the proposals for limiting interference, XtremeSpectrum's suggestion remains to be tested. Furthermore, since it relies on the end-user's compliance, and since it will work, if at all, for only one class of UWB device, this proposal underscores that a general, unlicensed approach to UWB deployment is bound to fail.

22 *See* Annex 1 to Comment of Sirius Satellite Radio.

III. The Commission Should Publish Its Proposed Regulatory Scheme And Allow All Parties To Comment

As Sirius has expressed several times in these proceedings, and as numerous parties have agreed,[23] the technical complexity of the issue, the lack of tests on various potential victim receiver types and on representative UWB interfering devices, and the interest of fairness and sound rulemaking procedure require that the proposed regulatory scheme, including the detailed technical and operational rules for each UWB device class, be made available for public comment before adoption. The information emerging from the record indicates that the key components of the future regulatory system will be the specifications of UWB device classes and the distinct operating and technical criteria governing each class. System operators and the general public have a strong interest in protecting licensed systems, and UWB proponents have a strong interest in ensuring that they are protected by a comprehensive and effective regulatory system. Therefore, it is essential that all interested parties be given the opportunity to comment on specific proposed regulations governing the future deployment of UWB devices.

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[23] *See, e.g.*, Comments of U.S. GPS Council, at 9; Comments of Nokia, at 1-2; *see also* Comments of the Boeing Company, at 11 (stating that further NPRM may be required). *See also* Air Transport Association of America *et al., ex parte* letter, (stating that further NPRM is required to allow all interested parties to review and comment on final rules before they are adopted).

Respectfully submitted,

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